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Introduction: Covert Contrasts

We were delighted that Professor Martin Ball invited us to guest edit this special edition of Clinical Linguistics & Phonetics on "Covert Contrasts" in child speech. Although the idea of covert contrasts is not new, there has been renewed interest in the topic recently due to new developments in the methodologies used to uncover these types of contrasts in child speech. These developments are highly significant, in our opinion, because they provide for the first time the potential to identify reliably the presence, and therefore also the prevalence, of covert contrasts in child speech.

In this Introduction we briefly define the meaning of the term covert contrasts, outline the importance of the phenomenon, and explain why it is pertinent to bring together research papers on this topic within a special edition at this time. First, what is meant by the term covert contrast? In essence, these contrasts involve sounds that the child produces differently (acoustically or articulatorily) but are heard and transcribed by listeners with the same phonetic symbol. In the field of child speech, a frequently used methodology for a variety of research and clinical purposes involves transcription based data, which show extensive neutralisation of phonological contrasts. However, closer examination of neutralised contrasts using an alternative methodology - namely instrumental techniques such as acoustic analysis, electropalatography EPG, or ultrasound – has provided convincing evidence that children do sometimes produce acoustic or articulatory contrasts that listeners hear as neutralised. These subtle differences in the production of contrasts are called covert because listeners do not readily detect them and therefore they pass unnoticed and unrecorded in transcribed data. Kornfeld (1971) summed up the phenomenon when he said "adults do not always perceive distinctions that children make" (p. 462) and that "adults are biased to hear children's speech in terms of their own (adult) distinctions" (p. 462).

Although covert contrasts were described nearly 50 years ago, there are surprisingly few research papers that report instrumental data on this topic. This small literature has nevertheless been influential in shaping our understanding of the nature of both typical and atypical speech acquisition as well as informing interventions for children with speech disorders. Taking some illustrative examples, researchers have found evidence that the presence of covert contrasts in children's speech is a positive sign of progress towards their production of an overt adult-like contrast. The presence of covert contrasts in children's speech has also lent support for the view that speech acquisition is a gradual process and that children can be making significant steps in phonetic mastery of the sound system that may not be captured fully in transcription data. In a recent review of evidence about the underlying nature of children's phoneme errors, it has been argued that "apparent substitutions are actually cases of covert contrast" (Richtsmeier, 2010, p. 12). Finally, for children with speech disorders, the presence of covert contrasts has been interpreted as indicating the children have fuller phonological knowledge of the sound system than might be assumed based solely on analysis of transcription data (Tyler, Edwards & Saxman, 1990).

Until recently covert contrasts have been identified using measurements derived from instrumental techniques, most frequently acoustic analysis and less frequently EPG and ultrasound. Three papers within this special issue (Gibbon & Lee; Zharkova, Gibbon & Lee; and Cleland, Scobbie, Heyde, Roxburgh & Wrench) review and discuss how measurements derived from these techniques have been able to reveal covert contrasts. The paper by Cleland et al. additionally discusses the idea of "Covert Error", which could be viewed as a parallel construct to covert contrast, and involves

articulatory errors that listeners hear and transcribe as a correct or acceptable production of the target sound. Such errors have been described extensively in the EPG literature on children with speech disorders, and the paper by Cleland et al. extends this research by presenting new evidence of covert errors from ultrasound data.

Whilst the use of instrumental techniques was ground breaking in revealing the existence and underlying articulatory characteristics of covert contrasts, these techniques have a major drawback. The drawback relates to the fact that the perceptual identity of sounds is characterised by a complex matrix of phonetic cues, any one of which could potentially contain a covert contrast. It is difficult, if not impossible, for researchers to predict in advance which of the multiple cues associated with a phoneme will contain covert contrasts. This situation makes the selection of appropriate measurements, or even appropriate instruments, problematic for researchers embarking on an investigation into covert contrasts. Furthermore, if at the end of an investigation no covert contrasts have been identified, it may not be accurate to conclude that none were present in the speech data; covert contrasts may have been present but manifest in cues that were not measured. This significant methodological drawback associated with the use of instrumental techniques could account for the relatively small number of studies reporting acoustic and articulatory data on covert contrasts.

This special issue is timely because recent studies have utilised a new source of data to identify covert contrasts. Importantly these data overcome the limitation of instruments outlined above. At first glance, it is perhaps surprising that the new methods use data based on listener perceptual judgments. Critically though, instead of restricting listeners to making a categorical choice of a transcription symbol, the new methods use perceptual rating scales of children's productions based on listener judgments of "target-likeness", "category goodness" or "prototypicality". When listeners are given this type of task, namely one involving a continuous rating rather than a categorical judgment, it turns out that listeners are in fact very good at detecting quite subtle phonetic differences found in covert contrasts and covert errors. Importantly, perceptual rating tasks have the potential to uncover covert contrasts regardless of which phonetic cues contain the contrast. As a result, these methodologies overcome the limitations inherent in instrumental techniques to detect covert contrasts. Three papers in this special issue (Munson, Schellinger & Edwards; Schellinger, Munson & Edwards; and Harel, Russo Hitchcock, Szeredi, Ortiz & McAllister Byun) present data using perceptual rating methodologies and they discuss the implications for future research.

Approaches that use perceptual ratings to identify covert contrasts are likely to lead the way in allowing researchers to uncover the presence and prevalence of covert contrasts and covert errors in children's speech. Up until now it has not been possible to estimate the full extent of covert contrasts in child speech, although some researchers predicted their occurrence to be widespread (e.g. Locke, 1979; Hewlett & Waters, 2004). Alongside perceptual studies, evidence from instrumental studies can provide essential complementary data about the articulatory and acoustic characteristics of covert contrasts in future research. Discovering more about the extent to which covert contrasts occur in child speech, as well as the underlying nature of these contrasts in both typical and atypical speech, will be a big step forward in our understanding of speech acquisition and speech disorders.

We would like to thank all the authors and co-authors who so generously contributed their papers to this special edition. We would also like to thank Professor Martin Ball for his constant support and encouragement during the preparation of this special issue and also the reviewers for their helpful comments on the research work presented in this volume. Collectively they made this edition a reality and our job rewarding and enjoyable.

Guest Editors: Fiona E. Gibbon and Alice Lee, University College Cork

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